Vinyard Creek Water Quality Monitoring Project

Water Quality
Sampling Plan
for

Vinyard Creek Agricultural Return Drain
Jerome County, Idaho

Developed for:

Northside Soil and Water Conservation District
Mid Snake Watershed Advisory Group
Idaho Department of Agriculture

Prepared by:

Idaho Association of Soil Conservation Districts
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Signature Approval Page

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Northside Soil and Water Conservation District Representative

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Idaho Department of Agriculture Representative

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Introduction

This project is designed to assess the effectiveness of the implemented best management practices (BMP) of the Vinyard Creek State Agricultural Water Quality Project (SAWQP) on water quality in the Vinyard Creek watershed. Vinyard Creek is a tributary of the Snake River in Jerome, County and drains an extensive agricultural area. Monitoring was done on Vinyard Creek itself and on the main agricultural return drain prior to the implementation of the project BMPs in 1985 and 1986 and after implementation in 1991. The 1985-86 monitoring was conducted before the SAWQP practices were implemented. The 1991 monitoring was conducted as post implementation monitoring. No monitoring has been done since that time and the Northside Soil and Water Conservation District (SCWD) is interested in assessing the effectiveness of the project after the full extent of BMPs have been implemented and have had time to affect the entire system.

Since the last monitoring was done Idaho Power has diverted the main drain as part of a wildlife mitigation project. The drain is now piped straight to the Snake River just above its confluence with Vinyard Creek, negating the drain's influence on lower Vinyard Creek. Even though the drain's influence on Vinyard Creek has been removed, the Northside SWCD feels that assessing the effectiveness of the SAWQP is important. This should provide evidence that the implemented BMPs did or did not improve water quality from the main drain, which still enters the Snake River and contributes to the load in the larger river system. It should be noted, however, that one of the main water quality concerns prior to BMP implementation was the effect of sedimentation on spawning and rearing habitat for salmonids and overall water quality in the lower section of Vinyard Creek. Those concerns have been removed by the diversion of the drain directly to the Snake River. The results of this project will indicate the effect the SAWQP has had on overall pollutant reduction but will not relate that to the drain's influence on Vinyard Creek itself.

Background

Vinyard Creek is a spring fed stream that is a tributary to the Snake River in Jerome County, approximately 10 km east of the city of Twin Falls. It empties into the Snake River just above Twin Falls Dam. It is a short stream (< 2km) arising from a spring source in a box canyon. The spring feeds into Vinyard Lake, which then discharges over a waterfall to form Vinyard Creek, which enters the Snake River from the north. One main agricultural drain historically fed into Vinyard Creek below Vinyard Lake a few hundred meters from the Snake River. This drain was the principle source of agricultural pollutants to Vinyard Creek.

Vinyard Creek was identified under the 1983 Idaho Agricultural Abatement Plan as a stream impacted by agricultural pollutants. Monitoring conducted by the Idaho Department of Health and Welfare, Division of Environmental Quality (IDHW-DEQ) in 1985 and 1986 showed high levels of sediment, nutrient and bacteria and were found to

impair the designated beneficial uses of Vinyard Creek. These pollutants adversely impacted fish spawning and rearing habitat and primary and secondary recreation. Vinyard Creek was placed on the 1996 303 (d) list of water bodies not meeting their designated uses for the Total Maximum Daily Load (TMDL) schedule. Due to the installation of the ag drain diversion it has been delisted on the 1998 list, pending approval by the EPA,

The Idaho Department of Health and Welfare, Division of Environmental Quality (IDHW-DEQ) conducted water quality monitoring in 1985 to assist the Northside SWCD in development of a planning grant under the SAWQP program to assess land uses that potentially affected water quality. This monitoring showed that sediment, bacteria and nutrients were impairing the designated beneficial uses and helped the Northside SWCD to receive a SAWQP implementation grant. DEQ monitored more extensively in 1986 under the SAWQP implementation grant. Both years of data provided pre-implementation water quality conditions.

Objectives

IASCD will work with the agencies previously listed to attempt to meet the following objectives.

a) Provide post implementation data for comparison of water quality conditions before the implementation of BMPs.
b) Assess existing water quality conditions and impacts from agricultural activities.
c) Use the data for public awareness.

Monitoring Program and Sites

This monitoring program will be managed by IASCD with assistance from the Soil Conservation Commission, the Northside Soil and Water Conservation District, NRCS and DEQ. Other groups involved include the Mid Snake Watershed Advisory Group (WAG) and Technical Advisory Committee. IASCD will conduct the fieldwork and supply the technical support, funding and equipment. Additional assistance for monitoring may be provided by SCC or NRCS personnel.

Monitoring will be done at two sites on the agricultural drain above the canyon rim and at one site on the main canal above the project area. See the copied map for approximate locations and Table 1 for a description of the three sites. Sampling will be done biweekly throughout the irrigation season. No monitoring will be done on Vinyard Creek itself since the drain no longer empties into it.

Table 1 Site Descriptions

Site	Description
1	¼ mile upstream of old Vinyard Creek confluence, above canyon rim.
2	Main drain below confluence of major subbasins, just northwest of Vinyard Road over I-84.
3	On main canal 5 miles above site 2, 2 ½ miles directly south of Eden.

Sampling Methods

Water Quality

Samples for water quality analysis will be collected by grab sampling directly from the source. The sampling sites the drain will be located away from any obstructions to avoid backwater effects within the channel. For incised shallow drains six one liter grab samples will be collected from a well-mixed section, near mid-stream at approximately mid-depth. For shallow sites (< 1ft) grab samples will be collected by hand using a clean one-liter stainless steel container. At sites where the water depth is greater than 1 foot, a DH-81 integrated sampler will be used. With all of the methods, individual samples will be collected at equal intervals across the entire width of the drain or creek. Each discrete sample will in turn be composited as mentioned in the following paragraph. The specific location, number of grabs and sample collection technique will be determined after observation of the conditions at each site.

Except for bacteriological samples, each grab sample will be composited into a 2.5-gallon polyethylene churn sample splitter. The composite sample will then be thoroughly homogenized and poured off into properly prepared sample containers. For samples requiring filtration (ortho-phosphorous), a portion of the sample water will be transferred into the filtration unit and pressure filtered through a .45 µm. GN-6 Gelman Metricel Filter. The resultant filtrate will be transferred directly into a properly prepared sample bottle. The filtration unit will be thoroughly rinsed with deionized water and equipped with a new .45 µm. filter at each sampling location. Water for nutrients that require preservation, will be transferred into preserved (H2SO4pH <2) 500 ml sample containers. The polyethylene churn splitter will be thoroughly rinsed with source water at each location prior to sample collection. Bacteriological samples will be collected directly from the midstream discharge into properly prepared sterile sample bottles. Parameters, analytical methods, preservation and holding times will be discussed later.

All sample containers will be equipped with sample labels that will be filled out using water proof markers and will indicate: station location, sample identification, date and time of collection. Clear packing tape will be wrapped around each sample bottle and label to insure that moisture from the coolers does not cause the loss of sample labels. All resultant samples will be placed in a cooler, on ice until delivery to the laboratory and

will have Chain-of-Custody forms sealed in zip-lock baggies with each sample shipment. All samples will be taken to Magic Valley Lab, in Twin Falls, for analyses.

Table 2. Water Quality Parameters

Parameters	Sample Size	Preservation	Holding Time	Method
Non Filterable Residue (TSS)	200 ml	Cool 4°C	7 days	EPA 160.2
Volatile Residue (TVS)	200 ml	Cool 4°C	7 days	EPA 160.4
Nitrogen-nitrate/nitrate	50 ml	Cool 4°C, H_2SO_4 pH < 2	28 days	EPA 353.2
Total Phosphorous	100 ml	Cool 4°C, H_2SO_4 pH < 2	28 days	EPA 365.4
Ortho Phosphorous	100 ml	Filtered, Cool 4°C	24 hours	EPA 365.2
Fecal Coliform, Total Coliform	250 ml	Cool 4°C	30 hours	Standard Methods

Field Measurements

At each location, field measurements for dissolved oxygen, specific conductance, pH, temperature and total dissolved solids will be taken. These measurements will be taken, when possible, from a well-mixed section, near mid-stream at approximately mid-depth. Calibration of all field equipment will be in accordance with the manufacture specifications. Refer to Table 3 for a list of field measurements, equipment and calibration techniques.

Table 3. Field Measurements

Parameters	Instrument	Calibration
Dissolved Oxygen	YSI Model 55	Ambient air calibration
Temperature	YSI Model 55	Centigrade thermometer
Conductance and TDS	Orion Model 115	Conductance standards
pH	Orion Model 210A	Standard buffer (7,10) bracketing for linearity

All field measurements will be recorded in a bound logbook along with any pertinent observations about the site, including weather conditions, flow rates, personnel on site, or any problems observed that might affect the quality of data.

Flow Measurements

Flow measurements will be collected with a Marsh McBirney Flow Mate Model 2000 flow meter. The six-tenth-depth method (0.6 of the total depth below water surface) will be used when the depth of water is less than or equal to three feet. A transect line will be set up perpendicular to flow across the width of the drain. The mid-section method for computing cross-sectional area along with the velocity-area method will be used for discharge determination. The discharge is computed by summation of the products of the partial areas (partial sections) of the flow cross-sections and the average velocities for each of those sections. This method will be used to calculate cubic feet per second.

Quality Assurance and Quality Control (QA/QC)

Magic Valley Labs uses EPA approved and validated methods. Laboratory QA/QC results generated from this project can be provided upon request.

QA/QC procedures from the field sampling portion of this project will consist of duplicates (at least 10% of the sample load) along with blank samples (one set per sampling event). The field blanks consist of laboratory grade deionized water, transported the field and poured off into prepared sample container. The ortho-phosphorous blank will be collected by filtering deionized water through the filtration unit and transferring the resultant filtrate into an appropriate sample container. The blank sample is used to determine the integrity of the field team's handling of samples, the condition of the sample containers supplied by the laboratory and the accuracy of the laboratory's methods. Duplicates consist of two sets of sample containers filled with the same composite water from the same sampling site. The duplicates are used to determine both field and laboratory precision. The duplicate samples will not be identified as such and will enter the laboratories blindly for analysis. Both the duplicates and blank samples are stored and handled with the normal sample load for shipment to the laboratory.

Data Handling

All of the field data and analytical data generated from each survey will be submitted to Idaho Department of Agriculture for review. Each batch of data from a survey will be reviewed to insure that all necessary observations, measurements and analytical results have been properly recorded. The analytical results will be reviewed for completeness and quality control results. Any suspected errors will be investigated and resolved if possible. The data will then be stored electronically to await further review and preparation of final reports. A final report will be generated by IASCD and IDA summarizing the results of this monitoring program.